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(54) Ceiling formwork support

(57) A stay for a ceiling formwork has a stay head (10) with a groove (11) undercut in a C-shaped manner, in which an engaging profile (46), which, for example, frames a shuttering-board element (45), can be inserted with its hook edge (47) so as to be secured against being lifted out unintentionally. A batten (36) projects upwards in the middle of the groove (11), so that two shuttering-board elements to be suspended opposite one another are held in the interlocked position independently of one another, thereby preventing accidents during the construction and dismantling of the formwork.

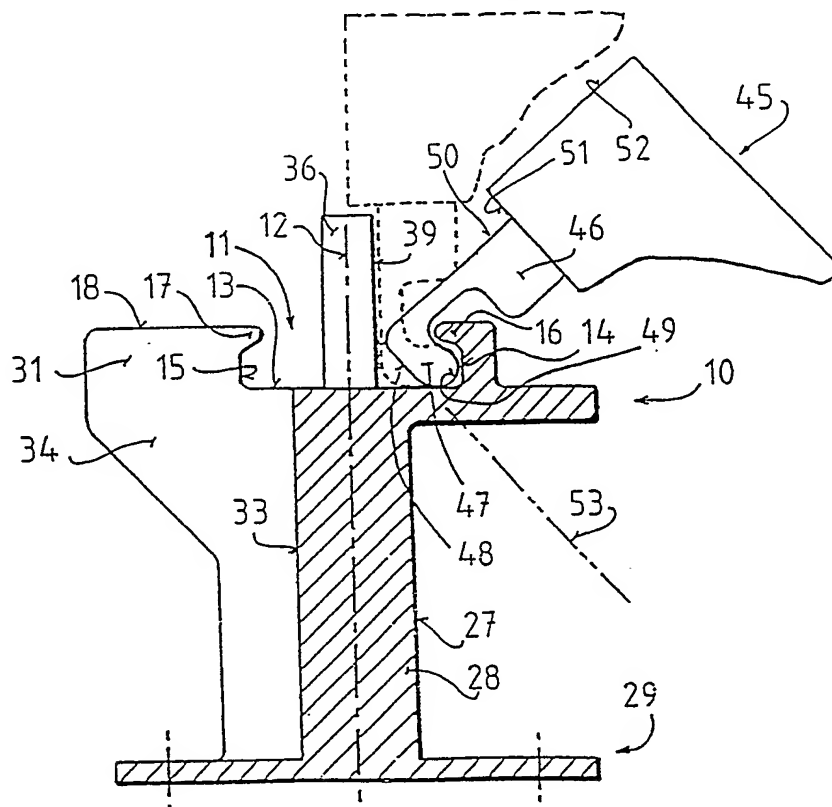


Fig. 2

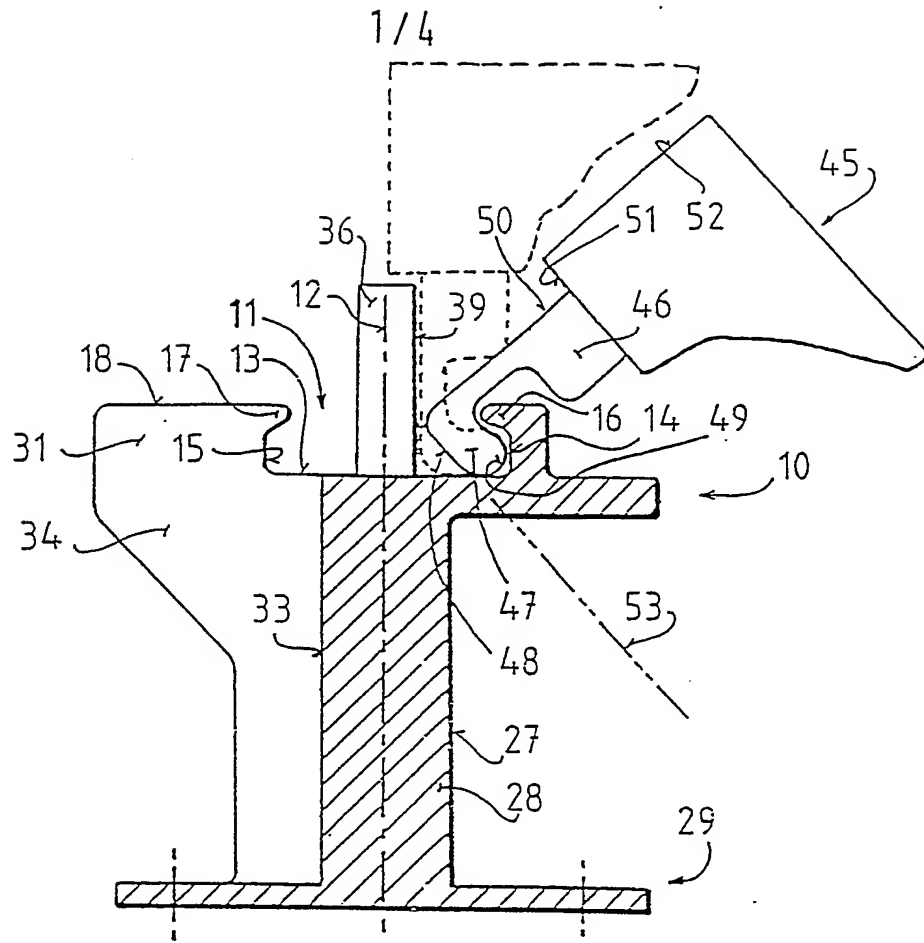


Fig. 2

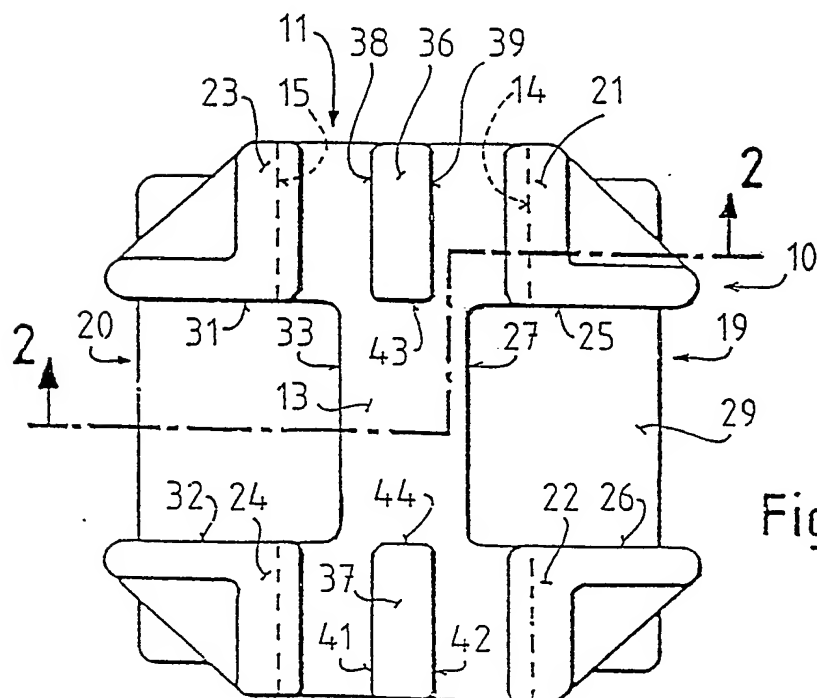


Fig. 1

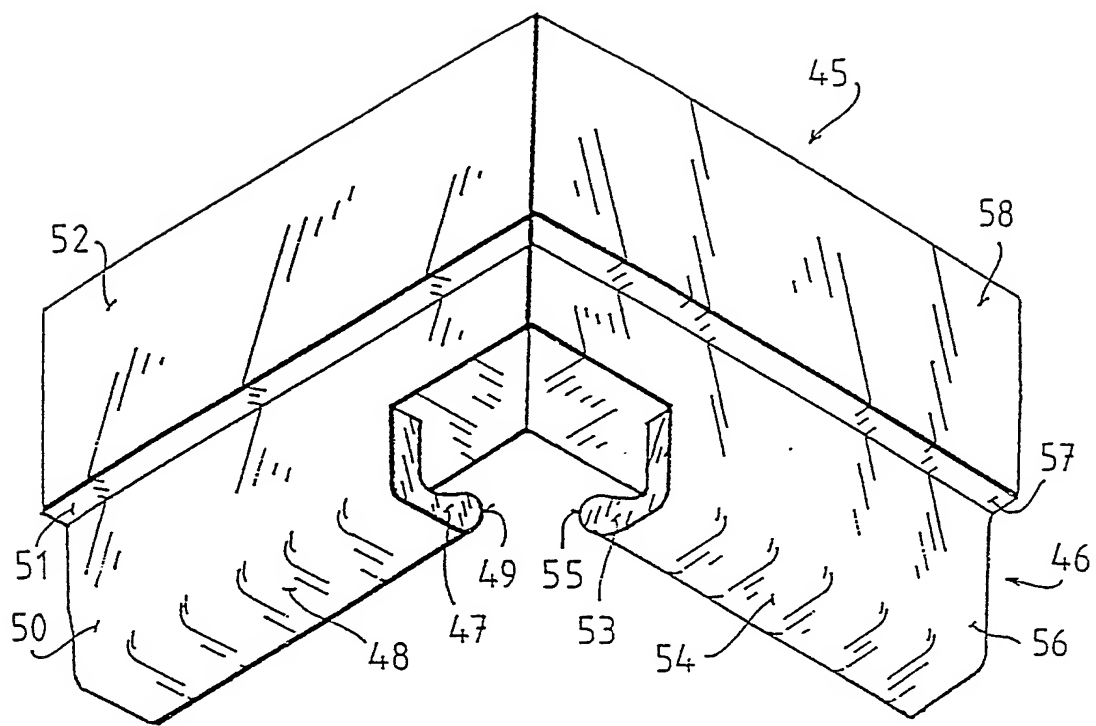


Fig.3

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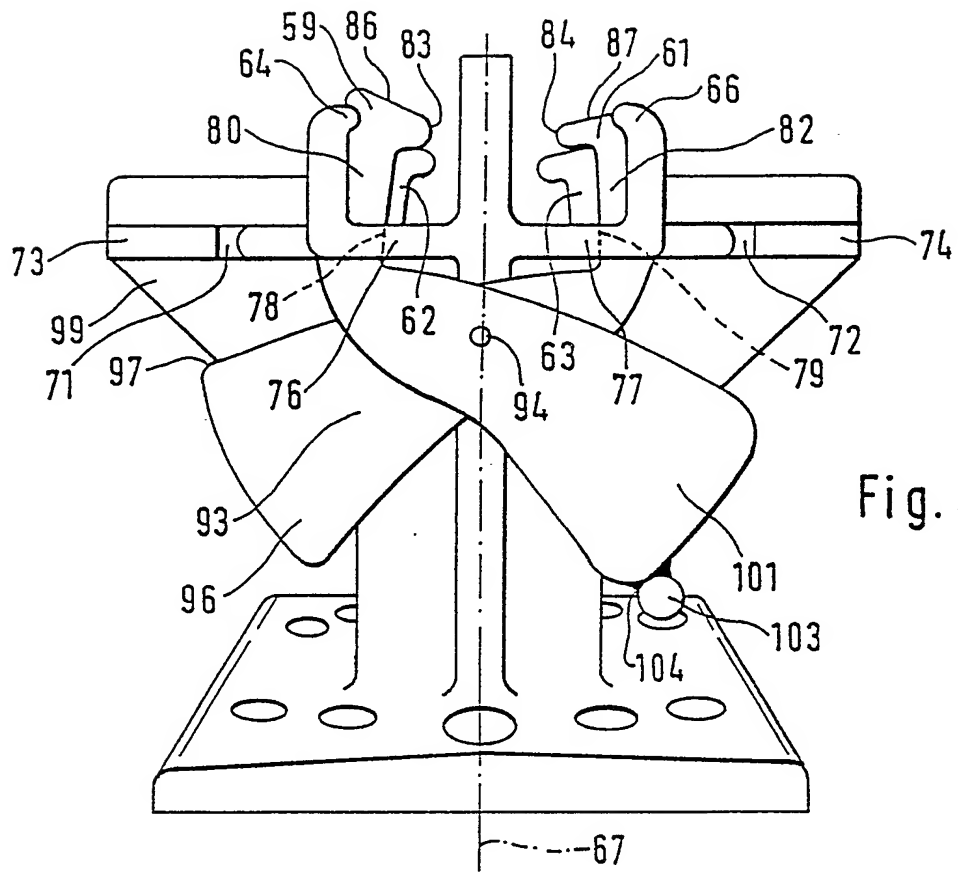


Fig. 4

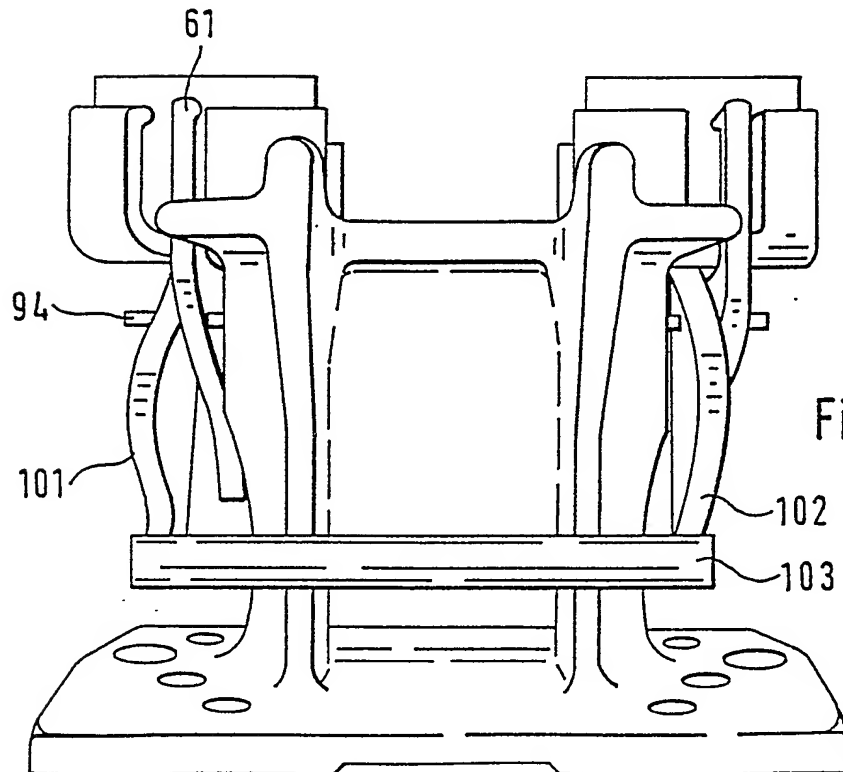


Fig. 5

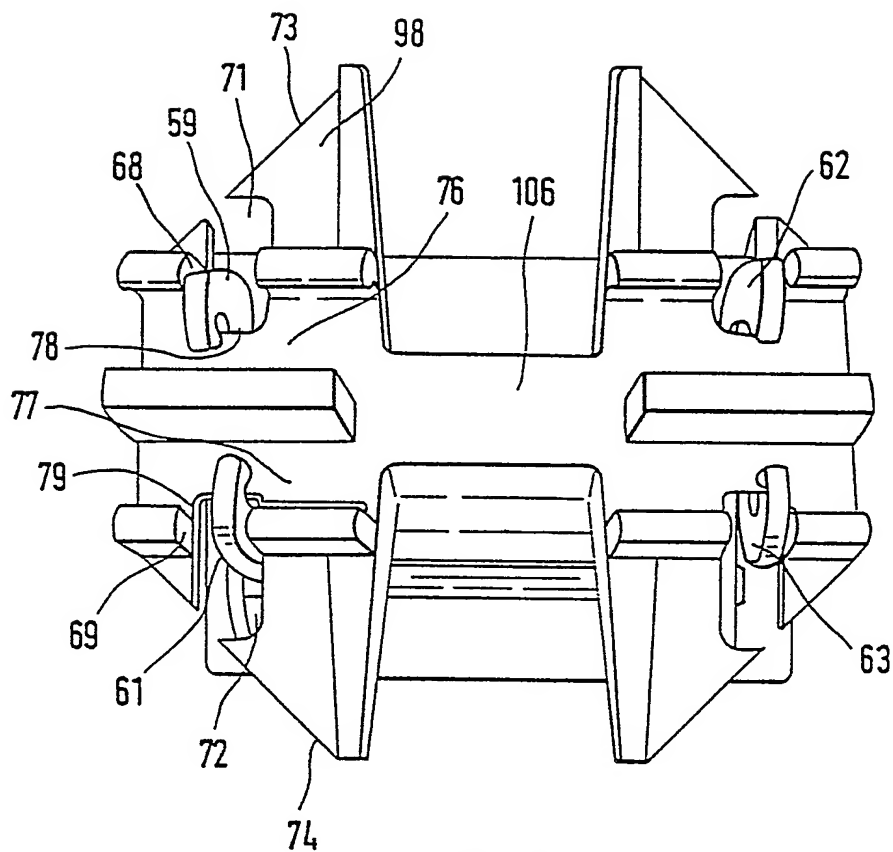


Fig. 6

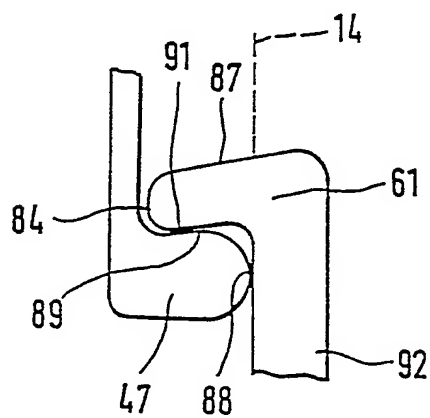


Fig. 7

SUPPORT DEVICE

The invention relates to a device for supporting ceiling formwork, particularly but not exclusively, according to the pre-characterising clause of Claim 1.

For producing a concrete ceiling in particular, stays, on which formwork parts are held at the necessary ceiling height, are required. For wood-joist bearers of a ceiling formwork, the stay head has an approximately U-shaped profile which engages round a wood joist on three sides. This simple shape of the stay head is designed for engaging profiles of rectangular cross-section, but cannot benefit from the advantages of modern engaging profiles having an L-shaped hook edge.

The object of the invention is to provide a device of the relevant generic type, which makes it possible also to make use of the particular advantage of modern engaging profiles.

This object is achieved by means of the characterising features of Claim 1.

As a result of the undercut groove, a modern engaging profile can be placed with its L-shaped hook edge onto the stay head, in such a way that the

hook edge is secured against being lifted out unintentionally.

5 In a development according to Claim 2, four shuttering-board elements, which are framed by respective engaging profiles, can be held in the common corner region by a stay head, the edge recesses allowing the tilting movement of each of the shuttering-board elements for the purpose of suspending and removing them. In the inserted
10 position, that is to say when all the shuttering-board elements rest horizontally, they are respectively interlocked with the common stay head, so that a highly stable platform can be erected without nails or the like.

15 The embodiment according to Claim 3 is advantageous when standard engaging profiles are to be used on all the board edges.

The measure according to Claim 4 allows a sufficient inward pivoting of the inner engaging
20 profiles for the purpose of suspending and removing shuttering-board elements.

The preferred development according to Claim 5 guarantees a reliable locking even of a single shuttering-board element, since, in the hooked-in
25 and pivoted-up position, its engaging profile is prevented by the batten from slipping away out of

the locking position. This safeguard of position between the engaging profile and stay head is of advantage during the construction of a ceiling formwork, because the stay head is not fixed in position only when all four shuttering-board elements rest on it. It is also advantageous if only two shuttering-board elements can nevertheless be hooked in securely in edge regions of a ceiling formwork.

10 The embodiment according to Claim 6 makes it possible to use the stay head universally, in that a U-shaped receptacle for conventional wood joists is provided between the part battens. According to Claim 7, the receiving region is utilised as efficiently as possible.

15 The stay head has a shape which involves a somewhat high outlay, and it is therefore more favourable in manufacturing terms to produce this stay head separately from the metre-long stay, for example as a casting. It is then practical to have the possibility of making the connection with the stay subsequently in the development according to Claim 8. Moreover, the flanged plate also allows attachment to the end face of a wood joist, that is to say any type of stay.

25 The design according to Claim 9 has advantages

in terms of manufacture, but use is also simplified on account of the symmetry, since there is no need to pay such close attention to the position of the stay head.

5 The engaging profile is expediently to be modified according to Claim 10. This guarantees that the two engaging profiles to be used on both sides of the batten can butt directly against one another above the batten and produce a virtually gap-free
10 ceiling formwork.

Further advantages and embodiments of the invention emerge from the following description of an exemplary embodiment with reference to the drawing.

15 In the drawing:

Figure 1 shows a top view of a stay head
 according to the invention,
Figure 2 shows a sectional representation
 according to the plane 2-2 of Figure 1,
20 Figure 3 shows a corner portion of a shuttering-board element,
Figure 4 shows a view similar to that of Figure 2
 for a second exemplary embodiment in a
 perspective representation,
25 Figure 5 shows the view from the right in Figure
 4 in a perspective representation,

Figure 6 shows the top view of Figure 5 in a perspective representation,
Figure 7 shows a part view of the top right-hand region of Figure 4 diagrammatically and in truncated form.

5 The stay head 10 has, according to Figure 1, a square contour with bevelled corners. In the cross-section according to Figure 2, it has an approximately C-shaped undercut groove 11, the
10 groove bottom of which forms a plane standing face 13 oriented perpendicularly to a longitudinal axis 12 of the stay. The groove edges produce two stop faces 14, 15 which are located opposite one another in parallel and from which hook strips 16, 17 extend
15 projecting at a distance above the standing face 13. The stop faces 14, 15 can rise out of the standing face 13 in an arcuately rounded manner and merge into the rounded hook strip 16, 17 in a likewise rounded manner. The surface 18 of the stay head, in
20 which the groove 11 is made, generally extends in a level plane at a distance above and parallel to the standing face 13.

Two edge recesses 19, 20 extend into the groove 11 from mutually opposite sides, with the result
25 that two aligned hook portions 21, 22 are obtained on one side of the groove 11 and two aligned hook

portions 23, 24 are likewise obtained on the other side.

5 The edge recess 19 forms two flat sides 25, 26 which are located opposite one another in parallel and are oriented perpendicularly to the stop face 14 and their distance from each other is equal to the clear width between the stop faces 14, 15. The inner limiting wall 27 runs between the longitudinal axis 12 of the stay and the stop face 14 in a manner oriented parallel thereto. In the example, the limiting wall 27 limits a central pedestal 28 which extends from the stay head 10 to a flanged plate 29 oriented at a distance from and parallel to the latter.

15 The opposite edge recess 20 is made mirror-symmetrical and forms two flat sides 31, 32 located opposite one another in parallel and an inner limiting wall 33 relative to the pedestal 28.

20 Formed on both sides of the edge recesses 19, 20 are struts, of which the inner faces pointing towards one another merge respectively into the flat sides 25, 26 and 31, 32 in a plane manner.

25 In view of the position of the sectional plane, only one of the total of four struts, which is designated by the reference numeral 34, can be seen in Figure 2. It extends from the stay head 10 as far

as the flanged plate 29.

At the axial height of the stop face 15, the flat side 31 extends over approximately the same width in the horizontal direction as the stop face 15, but is angled at 90° relative to the latter. A corresponding configuration is present at the corners between the flat side 32 with the stop face 15 and the stop face 14 with the flat side 25 or 26.

For the sake of saving weight, the material thickness in the corner regions of the stay head 10 is reduced, so that four respective L-shaped ribs project upwards from the plane of the standing face, the stay head 10 having an approximately H-shaped design, as seen in the top view.

Arranged in the middle of the groove 11 is a batten which is preferably interrupted in the middle region, so that two aligned part battens 36, 37 are obtained. They each have two plane guide faces 38, 39 and 41, 42, oriented parallel to the longitudinal axis 12 of the stay and to the stop face 14, and inner faces 43, 44 which point towards one another and which have the same distance between them as the flat sides 25, 26 or somewhat more. The part battens 36, 37 project axially upwards above the standing face 13 by approximately 2 to 3 times the depth of the groove 11.

The flanged plate 29 has a series of prefabricated holes, not particularly shown, so that it can be easily attached to joists or tubular stays.

5 To illustrate the use of the stay head 10, the situation in the corner region of a shuttering-board element will be explained first with reference to Figure 3. A shuttering-board element 45 comprises, first of all, a usually rectangular shuttering board (which cannot be seen here) which is framed by means of an engaging profile 46 on its four side edges. 10 The same engaging profile is preferably used all-round. The engaging profile 46 is designed, for example, as a hollow extruded profile made of aluminium, its internal structure being unimportant here. 15 What is important is that an L-shaped hook edge is formed at its lower margin.

Thus, along one edge of the board there runs a hook edge 47 having a lower face 48 parallel to the board plane, a stop counterface 49 directed inwards from the margin and an outer face 50 directed 20 outwards and oriented perpendicularly to the board plane. The outer face 50 is continued via a step 51 in an outwardly projecting margin face 52.

A hook edge 53 of identical design, with a 25 lower face 54, a stop counterface 55, an outer face 56, a step 57 and a margin face 58, is present along

the other board edge running at right angles thereto.

The situation is identical at the remaining edges of the board, but because they are identical it is sufficient for one corner of the board to be considered.

The suspension of the shuttering-board element 45 is illustrated in Figure 2, the initial state being indicated by unbroken lines and the operating state by broken lines. It goes without saying that the representation is simplified diagrammatically and the hook edge 53 preceding in the drawing plane is indicated only by a double-dot and dash line.

In the initial state, the hook edge 47 is located under the hook strip 16, whilst the hook edge 53 penetrates into the edge recess 19 (Figure 1). This is therefore necessary in order to make suspension in an oblique position possible. Then, when the shuttering-board element 45 is pivoted up into the shuttering position, the lower face 48 is supported over a large area on the standing face 13, the stop counterface 49 against the stop face 14 and the outer face 50 against the guide face 39. Between the latter, there is, of course, a small play in order to prevent a press fit. The stop counterface 55 of the other hook edge 53 then bears against the

flat side 25 (Figure 1). Thus, for the first shuttering-board element 45, the relative position in relation to the stay head 10 is already secured to such an extent that the hook edge 47 remains
5 reliably under the hook strip 16, thereby preventing the risk of unintentional removal and therefore the risk of an accident.

In a similar way to this, three further shuttering-board elements can be suspended and then
10 bear with their margin faces 52, 58 against one another in a plane manner, the separating gap between them being cross-shaped, as seen in the top view. At the same time, the width of the step 51, 57 is coordinated in such a way that the separating gap
15 is so narrow that virtually no concrete penetrates between them.

In the foregoing instance of use, the stay is located in the common corner region of four shuttering-board elements. The stay can, of course,
20 also be arranged between the corners of one shuttering-board element. In this case, for example, the hook edge 47 rests behind both aligned hook portions 21, 22 (Figure 1), the other hook edge 53 extending anywhere laterally next to the stay head
25 10 and therefore not being located in the region of the edge recess 19 for suspension. Consequently, if

stays are designed only for such uses, the edge recesses 19, 20 can be omitted. It goes without saying, however, that these edge recesses increase the universality of the stay.

5 In the second exemplary embodiment according to Figures 4 to 7, 4 locking parts 59, 61, 62, 63 are provided. These serve for engaging over the hook edge 47 when the shuttering-board element 45 has assumed the position represented by broken lines in
10 Figure 2. In comparison with the first exemplary embodiment, the hook strip 16, 17 has been shortened somewhat, so that it no longer extends so far into the associated groove 11, and only one inwardly directed shorter bead 64, 66 is provided. The stop
15 faces 14, 15 are the same, as are the standing faces 13. The locking parts 59, 61, 62, 63 can move towards the mid-plane of symmetry 67 and away from this. The longitudinal axis 12 of the stay also lies in the latter.

20 So that the locking parts 59, 61, 62, 63 can move in this way, the hook portions 21, 22, 23, 24 are provided with perforations on both sides of these approximately in the middle region. Since the plane symmetry plays an important part in the
25 device, only the configuration in the region of the locking parts 59, 61 is explained in more detail

below, the configuration in the region of the locking parts 62, 63 emerging automatically. According to Figures 5 and 6, the locking wall 22, 24 is provided approximately in its middle region with a respective clearance 68, 69 which extends perpendicularly to the mid-plane 67. It is two to three times wider than the locking parts 59, 61 which consist of heavy plate and which are 5 mm thick in the exemplary embodiment. Of course, the beads 64, 66 are also divided there into a region located further outwards and a region located further inwards.

This clearance 68, 69 is continued downwards in an open-edged horizontal transverse recess 71, 72 which extends from the oblique edges 73, 74 (it is open-edged there) beyond the hook portions 22, 23 into the bottom 76, 77 of the grooves 11. The inner edge 78, 79 serves as a stop for the inner edge of the neck 80, 82 of the locking part 59, 61, so that there remains between the guide faces 41, 42 and the inwardly directed nose 83, 84 a distance which allows the hook edge 47 the possibility of penetrating there when the shuttering-board element 45 is somewhat more horizontal than shown in Figure 2. Outwards and above the noses 83, 84, the locking parts 59, 61 have a slide-off flank 86, 87, so that

the hook edge 47 enters the respective groove 11 more easily.

According to Figure 7, the nose 84 is continued outwards in a flank 89 which is located in a self-locking angle region in relation to the topside 91 of the hook edge 47. In the exemplary embodiment, of course, the topside 91 is slightly convex in cross-section. The flank 89 can also be provided so as to descend, for the self-locking angle amounts to a few degrees. In the interlocking state, the neck edge 88 is aligned approximately with the stop face 14, that is to say is located outside the groove 11, and the locking part 81 faces only partially into the groove 11. The locking part 61 is continued downwards as a neck 92 which passes through the bottom 77 and constitutes at the bottom and on the left a sector-like widening 93. This has in the mid-plane 67 a passage bore, through which passes a cylindrical pin 94 which itself lies in the mid-plane 67 and horizontally.

All the mass located on the right of the mid-plane 67 is substantially lower than that of the weight wing 96 which is located on the left of it and which widens in the manner of a butterfly wing and allows a pivoting movement of this arrangement of 20 to 30 degrees, the other end of the pivoting

movement being reached when an edge 97 of the weight wing 96 butts against the underside 99 of the triangular reinforcement 98.

5 According to Figures 4 and 5, the weight wings 101, 102 of the locking parts 59, 62 are connected to one another by welding 104 in their lower corner region by means of a transverse rod 103. Each transverse rod 103 increases the counterweight in the direction of an overweight, and moreover the
10 locking parts 59, 62 can be pivoted out of the groove 11 when the transverse rod 103 is raised. Of course, such a transverse rod could also be provided for the locking parts 61, 63.

15 The weight wing 101 is pivotable about the same cylindrical pin 94. The locking parts, together with the neck, widening and weight wing, are best produced in one piece and congruently from heavy plate.

20 Now that these parts have been described in great detail, the arrangement and form of the other parts go without saying.

25 When the second exemplary embodiment is in operation, the shuttering-board element 45 is held at a lower inclination than in Figure 2, the hook edge 47 is lowered and the locking part 61 is consequently pushed outwards, the weight wing 96

rising. The shuttering-board element 45 is then brought into the position represented by broken lines in Figure 2, the weight wing 96 descends and the locking part 61 pivots into the position shown in Figure 7.

In the exemplary embodiment, therefore, 4 locking parts 59, 61, 62, 63 are provided, specifically at the respective locations shown, because the stay head 10 must of course be capable of supporting four shuttering-plate elements 45 which butt against one another and of which the edge directed forwards in Figure 3 is located respectively above the point 106 in Figure 6.

In the second exemplary embodiment, the beads 64, 66 can also be omitted completely. The locking parts 59, 61, 62, 63 have as it were replaced the passive hook strips 16, 17 with active hook strips, the flanks 89 of which act in the working state in the same way as the hook strips of the first exemplary embodiment.

The advantage in the second exemplary embodiment is that, in the horizontal state of the shuttering-board element 45, it is possible to enter the groove 11, that is to say the pivoting movement according to Figure 2 is unnecessary. Above all, removal of the formwork can be started at any point

whatsoever by releasing the locking parts 59, 61,
62, 63. In other systems, there is only a single
point where the removal of the formwork can be
started. If the shuttering-board element 45 tips off
5 when the formwork is being removed, it nevertheless
catches on the stay head 10.

Claims

1. Device for a ceiling formwork, comprising a stay head having a plane standing face oriented at right angles to the longitudinal axis of the stay and intended for an engaging profile, characterised in that the stay head (10) has an undercut groove (11) of approximately C-shaped cross-section, the groove bottom forming the standing face (13), and the groove edges constituting two stop faces (14, 15) which extend opposite to one another in parallel and from which project respectively hook strips (16, 17) pointing towards one another at a distance above the standing face (13).
2. Device according to Claim 1, characterised in that the stay head (10) has two edge recesses (19, 20) which extend from mutually opposite sides into the undercut groove (11), each edge recess forming two flat sides (25, 26; 31, 32) which are located opposite one another in parallel and are oriented perpendicularly to the stop face (14, 15) respectively interrupted by the edge recess.
3. Device according to Claim 2, characterised in that the clear width between the mutually opposite flat sides (25, 26; 31, 32) is equal to the clear width between the mutually opposite stop faces (14,

15).

4. Device according to Claim 2, characterised in that, as seen in the direction of the longitudinal axis (12) of the stay, the edge recesses (19, 20) extend below the level of the standing face (13) by at least once the depth of the undercut groove (11).

5. Device according to one of the preceding claims, characterised in that in the middle of the groove (11) is provided a batten (36, 37) which projects vertically upwards from the standing face (13) and which has two plane guide faces (38, 39; 41, 42) extending parallel to the longitudinal axis (12) of the stay.

6. Device according to Claim 5, characterised in that the batten is interrupted in the middle region, so that two part battens (36, 37) are formed.

7. Device according to Claims 3 and 6, characterised in that the distance between the part battens (36, 37) corresponds at least to the clear width between the mutually opposite flat sides (25, 26; 31, 32).

8. Device according to Claim 1, characterised in that provided at an axial distance under the stay head (10) is a flanged plate (29) which is connected fixedly to the latter and which is oriented perpendicularly to the longitudinal axis (12) of the

stay.

9. Device according to one of the preceding claims, characterised in that the design is mirror-symmetrical relative to a first plane of symmetry, extending parallel to the middle of the groove (11) and in the direction of the longitudinal axis (12) of the stay, and relative to a second plane of symmetry extending perpendicularly thereto and in the direction of the longitudinal axis (12) of the stay.

10. Device according to Claim 1, characterised in that the hook strip (16, 17) is actively movable at least partially with the effect of a locking function.

11. Device according to Claim 1, characterised in that a locking part (59, 61, 62, 63) of the hook strip (16, 17) can be urged out of the groove (11) counter to a force and moved into the groove (11) again by means of this force.

12. Device according to Claim 11, characterised in that this locking part of the hook strip is guided on the stay head by a guide device, specifically both in outward and in inward movement.

13. Device according to Claim 12, characterised in that this locking part of the hook strip is shorter than the hook strip itself.

14. Device according to Claim 13, characterised in that this locking part is substantially narrower than the hook strip is long.

5 15. Device according to Claim 11, characterised in that this locking part can be urged out of the groove at least substantially and preferably completely.

16. Device according to Claim 14, characterised in that this locking part has approximately the
10 thickness of plate, preferably heavy plate.

17. Device according to Claim 11, characterised in that this locking part interrupts the rigid region of the hook strip.

18. Device according to Claim 17, characterised
15 in that this locking part interrupts the hook strip approximately in the middle region.

19. Device according to Claim 17, characterised in that a clearance for this locking part is provided in the hook strip.

20 20. Device according to Claim 12, characterised in that the locking part is connected via a neck to a force accumulator exerting the force, the neck also having a stop face corresponding to the stop
faces.

25 21. Device according to Claim 20, characterised in that the stop face of the neck projects further

into the groove without the engaging profile inserted than with the engaging profile inserted.

22. Device according to Claim 20, characterised in that a clearance is also provided for the neck in the groove for its freedom of movement.

23. Device according to Claim 20, characterised in that the force accumulator is a gravitational-force accumulator.

24. Device according to Claim 23, characterised in that the gravitational-force accumulator comprises a counterweight which rises about a common pivot axis when the locking part is urged outwards, and in that the neck is connected to the counterweight via a neck extension.

25. Device according to Claim 23, characterised in that the gravitational-force accumulator is provided between a foot of the device in the space underneath the groove.

26. Device according to Claim 24, characterised in that the pivot axis extends in the longitudinal direction of the groove and preferably below the latter.

27. Device according to Claim 20, characterised in that the neck, neck extension and locking part are cut out of a single plate in an at least essentially plane manner.

28. Device according to Claim 1, characterised in that the locking part has a slide-off flank on its topside.

5 29. Device according to Claim 1, characterised in that the locking part has on its underside a flank which assumes a self-locking position in its interlocking position.

30. Device according to Claim 1, characterised in that the locking part is bend-resistant.

10 31. Device according to Claim 1, characterised in that at least one locking part is provided for each groove.

32. Device according to Claim 1, characterised in that, if there are four part grooves, a locking part is provided for each part groove.

15 33. Device according to Claims 12 and 32, characterised in that a common guide device is provided for each pair of part grooves.

34. Device according to Claim 24, characterised in that the counterweight of one locking part is located under the part groove of the opposite locking part.

20 35. Device according to Claim 34, characterised in that the counterweights have the form of butterfly wings, as seen in the longitudinal direction of the pivot axis.

25

36. Device according to Claim 24, characterised in that the locking part, neck and counterweight have at least essentially the same contour, preferably an identical contour.

5 37. Device according to Claim 34, characterised in that two locking parts located respectively on the same side are connected to one another by means of a common actuating rod extending longitudinally.

10 38. A device for use in supporting shuttering elements comprising support means and engagement means, said engagement means being adapted to cooperably engage with an engagement profile of a shuttering element such that relative displacement between said shuttering element supported by the
15 device and said support means in one direction is limited to a predetermined amount.

39. A device substantially as herein described with reference to accompanying Figures 1 and 2 and 3 to 7.

- 24 -

Patents Act 1977
Examiner's report to the Comptroller under
Section 17 (The Search Report)

Application number

GB 9307019.1

Relevant Technical fields

(i) UK Cl (Edition L) E1S (SSCB, SSD, SSB, SSG)

(ii) Int Cl (Edition 5) E04G

Search Examiner

A H MITCHELL

Databases (see over)

(i) UK Patent Office

(ii)

Date of Search

9 JULY 1993

Documents considered relevant following a search in respect of claims 1-37

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
A	GB 0905410 (SCAFFOLDING)	1
A	GB 0905408 (SCAFFOLDING)	1

Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

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